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DAEC Plant Support Center
Operated by Nuclear Management Company, LLC

October 11, 2001
NG-01-1192

Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station 0-P1-17
Washington, D.C. 20555-0001

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License No: DPR-49
Licensee Event Report #2001-003-00
File: A-120

Dear Sirs:

Please find attached the subject Licensee Event Report (LER) submitted in accordance with 10CFR50.73. There is one new commitment contained within this report:

> The controllers for both feed pump minimum flow valves will be replaced with a new model of controller. This action item has been entered into the modification review process and will be prepared and scheduled in accordance with that process (AR 27390).

Should you have any questions regarding this report, please contact this office.

Sincerely,

Rob Anderson

Rob Anderson,
Plant Manager - Nuclear

cc: Mr. James Dyer
Regional Administrator, Region III
U. S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532
NRC Resident Inspector - DAEC
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NRC FORM 366 (1-2001)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104	EXPIRES 6-30-2001

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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TITLE (4)
Manual Reactor Scram Inserted due to Failed Open Feed Pump Minimum Flow Valve

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	12	2001	2001	– 003 –	00	10	11	2001	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)

	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
	20.2203(a)(1)		50.36(c)(1)(i)(A)	X	50.73(a)(2)(iv)(A)		73.71(a)(4)
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
John W. Karrick, Nuclear Licensing	319-851-7901

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	SJ	FIC	G080	N					

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On August 12, 2001, while operating at 100% power, operators inserted a manual reactor scram due to decreasing reactor water level. The low level was caused by a reactor feedwater pump minimum flow bypass valve failing open. The "B" (affected) feed pump tripped on low suction pressure as operators attempted to restore level. All control rods fully inserted upon receipt of the manual scram signal. Primary containment isolations initially occurred as expected. A Group 1 isolation also occurred, after which all main steam isolation valves closed. This isolation was due to the decreasing reactor pressure with the mode switch in RUN and occurred quicker than expected. The root cause of the event was a failed resistor in the flow indicating controller that operates the minimum flow valve. Corrective actions include repair of the failed controller, preventive maintenance to the controller for the "A" feed pump, replacements of similar installed controllers, engineering analysis of the receipt of the Group 1 isolation, and a revision to the procedure for immediate actions in response to a reactor scram. There were no actual safety consequences or impact on public health and safety as a result of this event. The plant was re-started and returned to power operation on August 15, 2001.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

I. Description of Event:

On August 12, 2001, at 0746, a reactor water low-level alarm was received. The reactor operator (utility licensed operator) verified the low-level condition and took manual control of feedwater system level control. The operator matched feed flow and steam flow, after which 1P-001B, the "B" reactor feed pump, tripped on low suction pressure. A manual scram was inserted at approximately +182 inches (normal level of +191 inches) due to the decreasing reactor water level. All control rods fully inserted upon receipt of the manual scram signal.

Reactor water level dropped below +170 inches after the manual scram resulting in Primary Containment Isolation System (PCIS) Groups 2, 3, and 4 isolations. The Group 2-4 isolations functioned as designed. Reactor water level then recovered and increased to the high level trip of +211 inches which tripped 1P-001A, the operating reactor feed pump. At 0747, as the reactor operator was taking the mode switch from RUN to SHUTDOWN, a Group 1 PCIS isolation also occurred. All Main Steam Isolation Valves (MSIVs) closed upon receipt of the Group 1 isolation due to decreasing reactor pressure. The operating crew manually initiated Low Low Set (LLS) to control reactor pressure. Reactor pressure was lowered to approximately 900 psig through Safety Relief Valve (SRV) operation and was controlled by LLS. At 0805, the Group 1 isolation was reset and main steam line drains to the condenser were used to control reactor pressure. The reactor high water level trip was reset and the "A" feed pump was returned to service to control reactor water level. The plant was subsequently re-started and returned to power operation at 0132 on August 15, 2001.

II. Cause of Event:

The "B" reactor feed pump (RFP) tripped on low suction pressure. The low suction pressure was created by the minimum flow valve (CV1611) for the "B" RFP failing fully open. Troubleshooting and repair found a failed resistor in the amplifier circuit card of the Flow Indicating Controller (FIC1611) for the "B" feed pump minimum flow valve. The failed resistor is considered the root cause of the event.

The failed resistor was on the amplifier card in a General Electric model number 540 controller. The amplifier card had recently been replaced on May 29, 2001 (CWO A55626) during startup from Refuel Outage (RFO) 17. Procurement records indicate the card was first purchased in 1988. However, the service life of the resistor itself could not be determined since these cards are re-furbished and returned to the warehouse as spare parts. The external Operating Experience (OE) review performed for this event suggests the possibility of an age-related failure.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

III. Assessment of Safety Consequences :

All control rods inserted upon receipt of the manual scram. The lowest reactor level recorded during the transient was +135 inches (did not reach the low-low level setpoint of +119.5). The receipt of the Group 1 PCIS isolation (setpoint is 850 psig reactor pressure with the mode switch in RUN) was undesirable and has been analyzed by the engineering staff as a follow up action to this event. The drop in reactor pressure that led to the Group 1 isolation occurred sooner than previous plant transient data indicates. The primary contributor to the decreased reactor pressure that led to the isolation was the restoration of the second stage of the Moisture Separator Re-heater (MSR) that was implemented after RFO-17 (May 2001). The main steam lines were able to partially de-pressurize through the MSR second stage steam supply valves after the scram was inserted. By design, the subsequent turbine trip resulted in the closure of these steam supply valves and prevented further de-pressurization. Prior to RFO-17, the plant had not operated for any extended period of time with the MSR second stage steam in service. Interviews with operations staff also indicated that the order, priority, and training on the immediate actions in the procedure for response to a scram (Integrated Plant Operating Instruction (IPOI-5)) contributed to receipt of the Group 1 isolation. A revision to IPOI-5 is in progress to account for both of these factors.

The plant also experienced a few other minor equipment problems during the shutdown evolution. Intermediate Range Monitor (IRM) spiking occurred on the C, D, and F channels and a fuse blew on a Safety Relief Valve (SRV) bellows failure indicating light. These issues did not significantly affect operator response to the event and were addressed prior to plant startup.

There were no actual safety consequences associated with this event. There was no impact on public health and safety. There were no systems, structures, or components that were inoperable at the start of the event that contributed to the event. Variations in plant operating mode would not have increased the safety significance of this event.

IV. Corrective Actions:

1) The amplifier card was replaced to repair failed resistor on August 12, 2001 (CWO A56278).

2) The amplifier card for FIC1569, the minimum flow valve controller for the "A" reactor feed pump was inspected, and individual components, including the resistor, were replaced (CWO A55659) on August 13, 2001.

3) The controllers for both feed pump minimum flow valves will be replaced with a new model of controller (AR 27390).

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

IV. Corrective Actions (continued):

4) A review of the performance of other GE 540 controllers is in progress to evaluate upgrading the controllers with new models. This is part of an on-going Boiling Water Reactor Owners' Group (BWROG) sub-committee effort that DAEC Projects Engineering is actively participating in (ARs 27453, 27322, and 27323 assigned to Projects Engineering).

5) To minimize the potential for receipt of a Group 1 isolation on a routine manual scram, IPOI-5 is being revised to place a higher priority on placing the mode switch in shutdown (AR 26989, assigned to Operations).

V. Additional Information:

Previous Similar Occurrences:

A review of LER history identified DAEC LERs 84-001, 86-017, 90-002, 90-015, and 95-005 that involved reactor scrams associated with feedwater system equipment issues. There were actions initiated from the 1984 event to change the minimum flow valve design from a fail-open to fail-closed design, which may have prevented the need for this manual scram. However, due to the potential for feed pump damage, that design change was not implemented. The next three LERs involved feedwater regulating valve instrument air issues and the most recent event (95-005) involved a feed pump trip caused by a lube oil pump shaft failure. Therefore, the corrective actions taken in response to these LERs are not expected to have prevented this event.

EIIS System and Component Codes:

Feedwater System: SJ
Flow Indicating Controller: FIC
FIC1611: General Electric model 540 dual mode controller, serial number 393103621

A 10CFR50.72(b)(2)(iv)(B) notification was made on August 12, 2001, and is listed as event number EN 38202. This report is being submitted pursuant to 10CFR50.73(a)(2)(iv)(A).